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By C. C. LYFORD,
M. D., B. S., D. V. S.

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BY C. C. LYFORD.

THE subject of Sterility or Barreness in Mares is of vastly greater importance than one would at first sight be led to suppose. Only those who are actually engaged in the breeding business or are professionally called to treat such cases can comprehend the extent, as well as the serious nature of many of these complications. Besides, from a pecuniary point of view, it is of the greatest importance to the owners of stallions as well as mares, as very often the most valuable animals used for breeding purposes are practically of no use outside of the harem, as a consequence, are a source of expense without any returns; when on the other hand there should be a source of revenue, often of the highest character.

Successful fecundation is generally looked upon as a sure result of coupling the male and female sex at a certain period. Fleming says "Successful fecundation, however, is not always the case, and in some species, particularly the equine, sterility, temporary or permanent in the female is far from being uncommon, and is sometimes serious." The same writer says that in the studs of France, the fruitful mares are 59.57. At the haras of Pin, during a period of twenty years, there was a percentage of 68.27 fecund mares, abortion 5.06. This would leave about 64.82 to have colts. These figures indicate that only one half or, at the most, two-thirds of the mares produce foals. Quoting from Fleming's Obstetrics, "Sterility may depend upon organic or

physical causes, and may amount to permanent impotency, more particularly when congenital, and located in the generative apparatus. Monstrosities, hermaphrodites, animals in which one or more important organs of the sexual apparatus are absent, and Hybrids, are generally permanently sterile."

"Prolonged continuence and old age are not unfrequent causes of infecundity, as is witnessed in mares which have worked in towns, and then been transferred for breeding purposes. It may likewise be due, though temporarily, to premature or tardy coition, where the generative organs are not in a physiological condition for conception, or where they are in an irritable, abnormal state. Underfed or overfed animals generally do not breed so readily as those which are in moderate condition ; fat animals are especially unfruitful. Excitable, vicious mares are less likely to procreate than those which are of an equable and gentle disposition. The latter are often impregnated at one attempt, and it has been observed that with mares accustomed to work, active exertion, even to produce fatigue before being put to the horse, is favorable to conception. So it is that the Arab submits his horse to a severe gallop, and brings her almost breathless before the stallion, when, the act being accomplished, he leaves her quietly at rest for some hours."

I have known of one case where of a litter of six boar pigs, four were fed sugar and molasses to hurry up growth; after which all four proved to be barren, while the two that were turned out on ordinary feed were productive.

Again various diseased conditions of the generative organs, as well as general derangements, may also prove antagonistic to fecundity. There may be disease or alterations

in the Ovaries, Fallopian Tubes, Uterus or Vagina, which will hinder conception, and if any material obstacle to the contact of the spermatic fluid with the ovule be present in these parts, fecundation cannot take place. Tumours of various kinds in this region are not an infrequent cause of sterility.

Rueff and others have observed an imperforate, dense and tough hymen to be a cause of infecundity in the mare.

"In all of these conditions a careful examination should be made as removal of the obstacle to generation may be quite within the scope of surgical or medical measures. More particularly is this the case when the obstacle is related to some abnormal condition of the cervix uteri, a circumstance more common than is generally supposed. In rare instances dilation may require to be effected by a cutting instrument, but this should never be resorted to until the simpler and safer means have failed."

Before taking into consideration the disease to which the organs are subject, I will notice briefly the anatomy of the parts both male and female, and their physiological functions.

The male organs of generation consists of the Penis, which not only supports the greater part of the excretory urinary canal, but also transmits the sperm of the male. The Penis proper consists of the corpora cavernosum extending from and forming the bulb, tapering gradually at the anterior extremity of the penis, occupying the upper surfaces, and divided by septem into two latteral halves, groved on its under surface for the corpora spongeosum and urethra. The corpora spongeosum encloses the urethra, extending from the crura posterior passing to the external extremity which expands to form the glands.

FIGURE 1.

Generative Organs of the Stallion with Arterial supply.

1. Posterior Aorta.
2. External iliac artery.
3. Umbilical artery.
4. Prepubic artery.
5. Deep femoral artery.
6. Posterior abdominal artery.
7. Externial pubic artery.
8. Subcutaneous abdominal artery.
9. Spermatic artery.
10. Testicle.
11. Epididymis.
12. Vas deferens.
13. Penis.
14. Anterior dorsal artery of penis.
15. Urethral Tube.
16. Posterior dorsal artery of penis.
17. Suspensory ligament of the penis.
18. Erector penis.
19. Artery of the corpus cavernosum.
20. Cowper's gland.
21. Prostrate gland.
22. Vesico prostatic artery.
23. Sphincter Ani.
24. Retractor penis.
25. Suspensory ligament of rectum.
26. Vesiculæ seminalis.
27. Rectum.
28. Ureter.
29. Urinary Bladder.
30. Oblurator artery.
31. Internal pubic artery.
32. Posterior mesenteric artery.
33. Iliaco femoral artery.
34. Gluteal artery.
35. Lateral sacral artery.
36. Last lumbar artery.
37. Internal iliac artery.
38. Second last lumbar artery.

FIGURE 1.

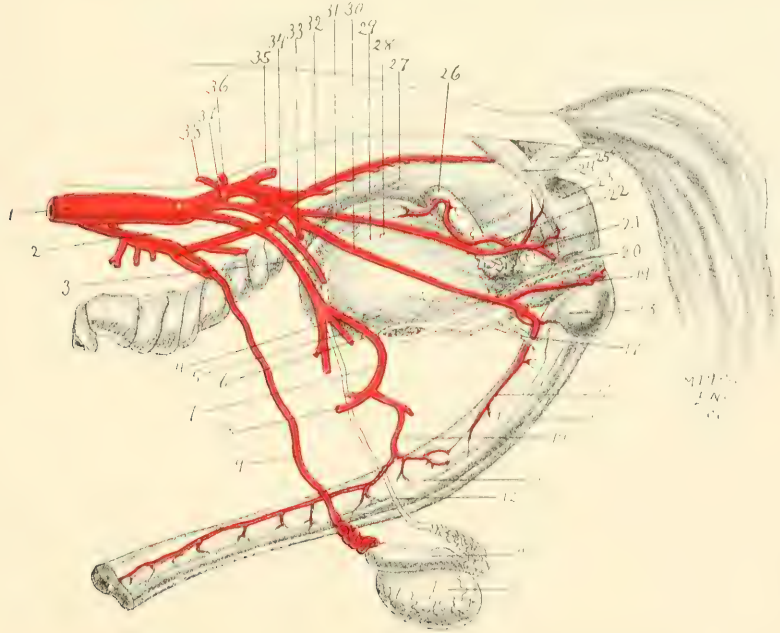

FIGURE 2.

Longitudinal section of the free extremity of the Horses Penis in a relaxed state.

1. Erectile tissue of the corpus cavernosum.
2. Urethra.
3. Fossa navicularis.
4. Urethral tube.
5. Erectile tissue of the Urethra.
6. Ditto of the glands.
7. Corona Glandis.
8. Urethral Sinus.
9. Integament and blood vessels of Penis.

FIGURE II.

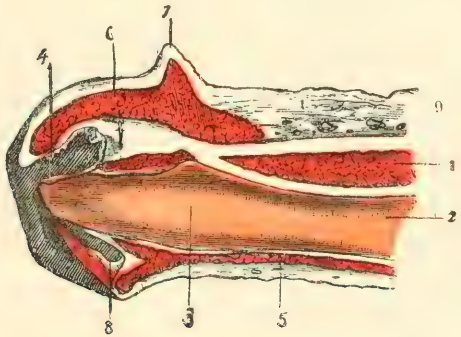

FIGURE 3.

Longitudinal section of the free extremity of the Horses Penis in an erect state.

1. Erectile tissue of the corpus cavernosum.
2. Urethra.
3. Fossa navicularis.
4. Urethral tube.
5. Erectile tissue of the Urethra.
6. Ditto of the glands.
7. Corona Glandis.
8. Urethral Sinus.
9. Integament and blood vessels of Penis.

FIGURE III.

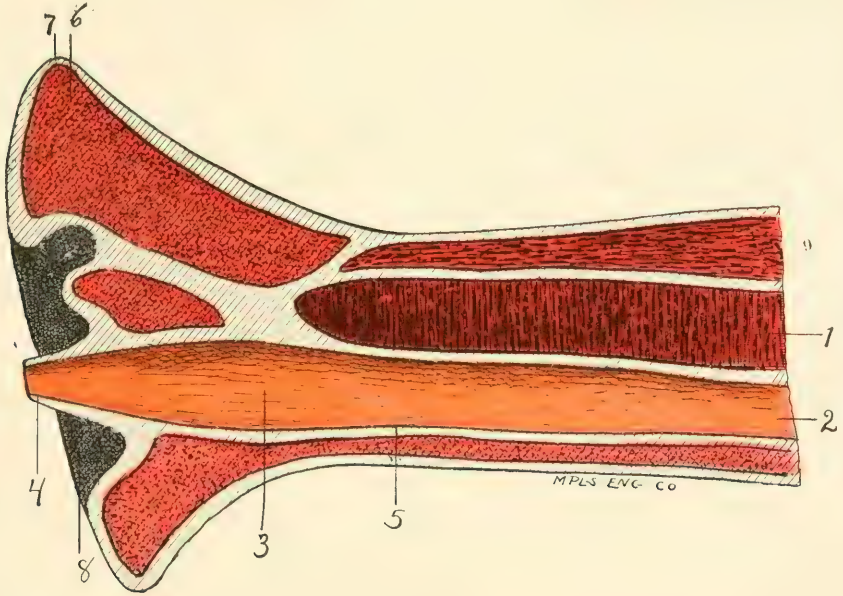

FIGURE 4.

Bladder and Interpelvic portion of Urethra, opened from below.

1. Vas deferens.
1. Bulbous part of the same.
2. Peritoneal fold joining the vasa deferentia.
3. Bladder.
4. Vesecula seminalis.
5. Orifices of urethres.
6. Prostate.
7. Verumontanum with orifices of ejaculatory ducts
8. Orifice of prostatic vesicle.
9. Cowper's gland.
10. Orifices of ducts of prostrate.
11. Orifices of ducts of cowper's gland.
12. Corpus cavernosum.
13. Corpus spongeosum with urethra in its center.

FIGURE IV.

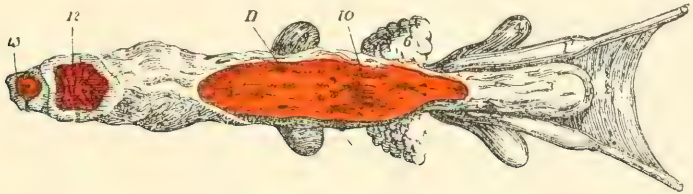

FIGURE 5.

Generative Organs of the Mare. isolated and partly opened.

1. 1. Ovaries.
2. 2. Fallopian Tubes.
3. Pavilion of the tube, external face.
4. Ibid inner face, showing the opening in middle.
5. Ligament of the ovary.
6. Intact horn of the uterus.
7. A horn thrown open.
8. Body of uterus, upper face.
9. Broad ligament.
10. Cervix, with its mucous folds.
11. Cul-de-sac of the vagina.
12. Interior of the vagina, with its folds of mucous membrane.
13. Urinary meatus.
14. Valve of urinary meatus.
15. Mucous fold, a vestige of the hymen.
16. Interior of the vulva.
17. Clitoris.
18-18. Labia of the vulva.
19. Inferior commissure of the vulva.

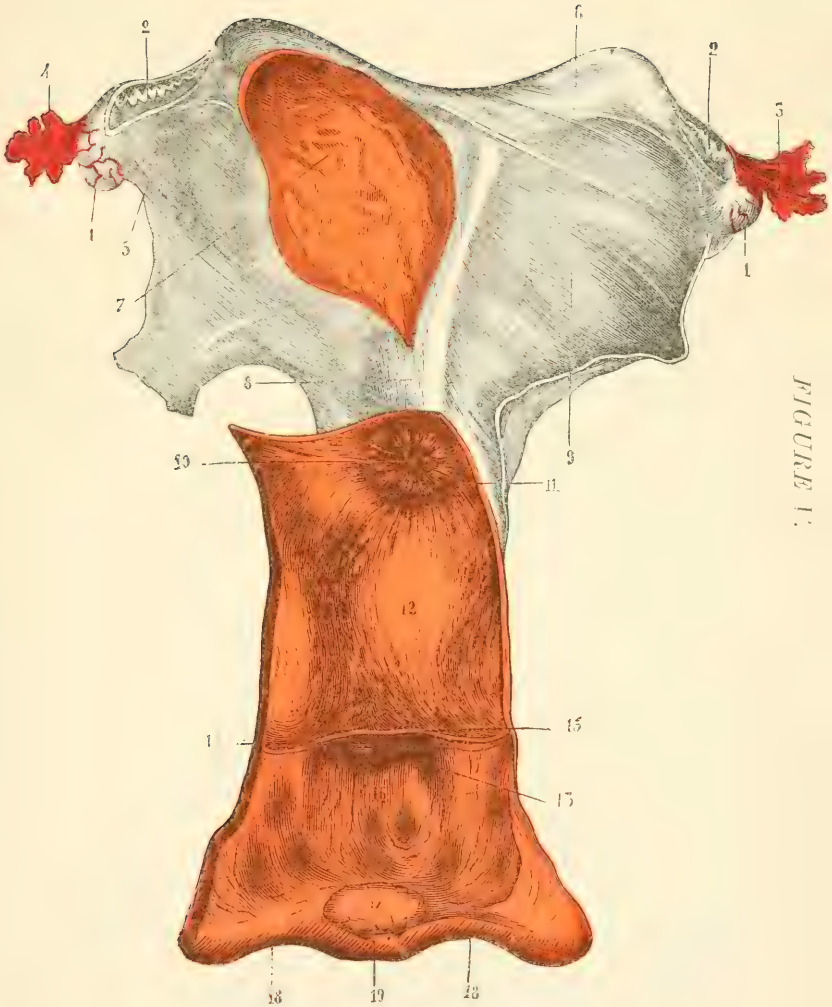

FIGURE 1.

PHYSIOLOGICAL CONDITIONS OF COPULATION.

It will be necessary to describe the physiological conditions of copulation to show upon what depends the normal action of the respective organs, male and female, during the act of coition. That the male organ—the penis—should be erect is necessary, and that the glands should be very considerably enlarged from its normal state is also essential. It will be seen, by reference to Figure 3, that the glands and penis assume the form and serves the purpose of a valve and piston. The enlarged glands should fill the transverse diameter of vagina so completely as to withdraw and expel the air, thus forming a vacuum within the cervix and uterus, and in case the cervix is kept sufficiently open and retained in the center of canal, either by natural or artificial means, so that the urethral sinus of the glands shall fit the corresponding posterior surface of the cervix, and that the projecting end of the urethral tube may approximate closely to, or even fit into the opening of the Os Uteri. Should no obstruction exist between vagina and uterus these conditions assure a perfect injection of semen into cervix and uterus, and as the glands assumes its natural size and by its withdrawal from the vagina, allowing air to pass into the uterus, thus further assisting the access of semen.

It is evident that a variety of influences may interfere with the performance of the natural process of fecundity. For its accomplishment four thing are necesary :

1st. The possibility of the entrance of semial fluid into the uterus.

2nd. The possibility of the production of a healthy ovum.

3rd. The possibility of the entrance of an ovum into the uterus.

4th. The absence of influences in utero destructive to the vitality of the semen, and preventive of fixation of the ovum upon the uterine wall.

Should these four conditions exist no animal will be sterile, she may not bear a foal, but the incapacity may attach to the male and not to her.

The special causes of sterility, or those interfering with these conditions, may thus be presented.

1st. Causes preventing entrance of semen into uterus

a. Absence of the uterus or vagina.
b. Presisting hymen.
c. Vaginismus.
d. Atresia vaginæ, or complete obliteration.
e. Occlusion of cervical canal.
f. Conical shape and elongated cervix.
g. Patulous Os, and flaccid or flabby condition of uterus.
h. Endometritus or Leucorrhœa.
i. Polypi, or Fibroids.
j. Flexion of uterus and cervix.
k. Very small Os Internum.
l. A curtain of membrane, either, or both, external or internal to cervix.
m. Equine Spyhilis.

2nd. Causes preventing the production of a healthy Ovum.

a. Chronic Ovaritis.
b. Cystic disease of both ovaries.

c. Cellulitis, or Peritonitis obliteration of the Fallopian tubes.
d. Absence of ovaries.
e. Hemorrhage into ovaries.
f. Undeveloped state of ovaries.
g. Atrophy of ovaries from old age.

3rd. Causes preventing passage of Ovum into Uterus.
a. Stricture or obliteration of Fallopian tubes.
b. Absence of Fallopian tubes.
c. Detachments and displacements of Fallopian tubes.

4th. Causes destroying vitality of semen or preventing fixation of impregnated Ovum.
a. Corporeal or Cervical Endometrities.
b. Membraneous Dysmenorrhoæ.
c. Menorrhagia or Metrorrhagia.
d. Abnormal growths.
e. Areolar Hyperplasia.

1st CLASS.

a. Absence of Uterus or Vagina.

I have met with but one case of absence of the uterus. During the summer of 1872, a young heifer showed signs of rut, and having a bull much larger than she was, it was not surprising to notice her look droopy after copulation, especially as she was pushed through an ordinary board fence. The heifer was allowed to stand around and attend to herself some three or four days, during which time she continually strained as if to urinate, occassionally passing a small quantity of blood. Having killed her on the fourth day I made an autopsy, finding the abdominal cavity containing several gallons of urine ; a hole through the anterior portion of the bladder showing that the penis had evidently passed

through the meatus urinaris rupturing the bladder. Two small congested ovaries were found, but no uterus.

b. Presisting Hymen.

I have met with quite a number of cases of this kind and most of these were thicker than natural, some of the cases requiring considerable force to rupture the membrane.

c. Vaginismus or Hyperasthetic state of the Os uteri, which results in spasms of sphincter.

These cases are by no means rare and are a common cause of sterility. It not only interferes with the entrance of the male organ because of the pain induced, but prevents the seminal fluid from getting into the uterus as the stallion in these cases is usually prevented from making a close cover.

d. Atresia of the vagina is not very common in mares and then following laceration, or by organization of inflamitory lymph. (These conditions appear most commonly in cows; more often following the first calf, than subsquent cases.) The treatment is generally unsatisfactory, requiring instrumental and surgical treatment, which is often of no avail.

e. Occlusion of Cervix or Rigidity of Os Uteri.

According to Fleming Occlusion of the cervical canal may be due to spasmodic conditions of the muscle and cervix. If however, there be hypertrophy disorganization or rigidity, then an operation will be necessary.

Both rigidity and spasmodic condition of the Os Uteri are of very common occurrence and are liable to be associated with many of the other troubles of the female generative organs. The spasmodic condition may be simply a consequence of irritation elsewhere. This condition is most common in young mares that have never conceived,

but I have met with one case of rigidity where the mare was twenty-three years old, and was the dame of several colts. I have also met with the spasmodic condition in some cases during one heat, while at the next period it had entirely disappeared. This will, I think, account for many of the cases which have been served repeatedly during a season and all at once conceive at a single leap from another stallion or ever from the same one.

f. Conical shape of Cervix and Elongated Os Uteri is a very common cause of infecundity. By its bending on itself it may not admit the seminal fluid through the canal, and as a rule completely prevents it. This state of affairs not only causes trouble in the breeding of mares but also in the human family. Thomas on Diseases of Women says, "My experience leads me very positively to the conclusions that, excepting credometritis, this is the most common of all causes of sterility and fortunately one of the most remediable." The treatment recommended varies somewhat with the length from dilation, bilateral operation and amputation.

It is very apparent with these conditions in mares that the cervix does not draw down and become flat and open as it should do when the vagina "balloons up," or become rigid as happens ordinarily during copulation. For these reasons the cervix is left projecting into the vagina, often to the extent of two or three inches, consequently the glands penis presses it to one side during the act of copulation and there is little or no chance for the semen to get into the uterus. When the pressure is removed the cervix projects into the vagina thus preventing the semen from entering. Right here I will say that it is not necessary for the cervix to be tense and closed to prevent the semen getting within the uterus, for I have known many cases where the cervix was

long, loose and flabby, with an opening large enough to admit two or three fingers, and still the mare failed to conceive until artificial means were used.

I wish to sight but two cases of the tense or closed Os, one Belvedere by Mambrino Patchen another Gypsy Queen by Polanius, and in case of elongated patulous cervix in a mare of my own, Mabel H. 2:26, by Col. West, 2579.

In regard to the first case I will quote from a letter from Byron G. Kimball of Maple Point Stock Farm, Bradford, Mass. "The mare Belvedere I bought of William Turnbull of New York City, for Col. H. A. Hale, of Bradford, and sold her at a sale in Boston, and she was bought by H. W. Phelps of Minneapolis. I had bred this mare, according to my books, on an average of twice a month for twenty-seven months with Warder, Hudson and various other stallions. I tried an impregnator on her but it did no good. It was rubber but more bell shaped than yours.

Also from a letter from O. J. Evans, M. D., Minneapolis.

Minneapolis, Minn., Jan. 6th, 1891.

C. C. Lyford, M. D., V. S.

Having used your "impregnator" on my Mambrino Patchen mare Belvedere, 19 years old, that was bred by Mr. Henry Hale, of Bradford, Mass, to Warder, by Belmont, and to Hudson by Kentucky Prince, and by H. W. Phelps, of Minneapolis, Minn., to Bayardo at least four times, all without impregnation, and having succeeded in getting her in fold during first heat by Red Chieftain using the impregnator, and having used it on several other mares that had refused to breed one or more seasons, among them Gypsy Queen, by Polanius, she being a mare twelve years old and had been bred to different horses at least four seasons without being in foal.

It is rational treatment, being in the nature of a funnel to convey the semen into the womb where it is necessary it should pass in order that it come in contact with the female ovule which it must do before impregnation takes place.

Truly Yours,

O. J. EVANS, M. D.

P. S.—I omitted to state that Belvedere nor Gypsy Queen had ever been in foal until this season and both are NOW SURE.

Evansdale Stock Farm, Sept. 1st, 1891.

C. C. LYFORD,

Belvedere had a find horse colt April 3, '91, Gypsy Queen a filly April 13, '91.

WASHBURN, Supt.

Also from F. W. Muckey, Minneapolis, "I owned the bay mare, Gypsy Queen, and bred her two years without success; I then sold her to J. K. Sidell of Minneapolis, thinking her barren, as she was a young mare and we had used every means then known to the profession. Since then she has become the property of Dr. O. J. Evans and I understand he has been unsuccessful until he used your 'Impregnator,' and with the first trial succeeded in getting her in foal."

In the case of Elongated Patulous Cervix of Mabel H, already referred to; this mare, at the age of five years, had a filly by Phallas 2:13¾. The next two years she was not stinted but returned to Phallas for the season of 1887 and 1888, but failed to conceive. On February, 1889, she was sent to T. B. Marrett's farm at Rosemont, Minn., and was stinted to Nutwood Mambrino until June 1st, without any good results. June 13th I again had her returned to

Nutwood Mambrino, using an impregnator from which she conceived, the result being a chestnut horse colt, born June 3d, 1890, now registered vol. x, Wallace Trotting Register as Woodnot, 15234.

9. Patulous Os and flaccid or flabby condition of the Uteri.

These cases are very common in mares, generally in those which have had colts or aborted, but are sometimes seen in mares which have never been in foal, or been stinted. The cervix is very loose and flabby, which is often more or less associated with a like condition of Vagina and Uterus: the Os at times being so open as to admit the entire hand with little or no resistance. I had a case of this kind at the Bruce Stock Farm, Rosemont, Minn. The mare had aborted something over a year before, since which time they were unable to get her in foal, She appeared otherwise in good health, worked every day and kept in good heart and flesh. I had the Uterus and Vagina flooded daily for five weeks with Hydropult, using for an injection, alternate days, carbolic acid 1-100 warm water, corrosior sublimate 1-1000. In other cases I have used successfully Tannic Acid alternating with Sulp. of Zinc, each dissolved in water. This was continued until signs of heat returned the second time, when after being stopped, her cervix was swabbed out with Iodoform Ointment 1-10, and the third day was served. The Os was so contracted that the large sized Impregnator went in with such difficulty as to require use of dilator. When examined for treatment her cervix would admit, with ease, the entire hand, Uterus and Vagina being equally flabby. The mare has since failed to receive another embrace though repeatedly tried for over three months, and shows every indications of being in foal.

Another case of this kind was one of my own, Nellie Gray, dam of Mabel H., a mare twenty years old, having failed to conceive for five years and having aborted six years ago, though being repeatedly stinted to various stallions, before I purchased her in 1889. I had her stinted during that season to Col. West, 2579 and during the season of 1890 to Morrel Tyrant and Greymont, the last two being young stallions, but to no avail. During the fall of 1890 I examined her, finding her cervix not only sufficiently open to easily admit three fingers, but the cervix was torn on its upper portion and on the right side of the Cul-de-sac of Vagina, from the Vagina wall to the Cervix, was a complete honey comb, having evidently been lacerated at various times during copulation. Having decided to give her tonic treatment and regular exercise, she was left without further stinting until April, 1891, when I examined her and found her vagina and cervix normally contracted and in heat. She was then stinted to a three year old son of Jersey Wilkes from which she is now surely in foal.

Various modes of treatment have been tried for the lax weakened condition of cervix and uterus, which may be classed as constitutional and local. The former class of remedies I have not given a thorough trial, though the cases on which I have used them indicate favorable results. These consist of general tonics, especially stimulating and invigorating aphrodisiacs, such as Phosphorus, Cannabis Indicas, Nux Vomica, Ergotine, and Arsenate of Iron. Also Saw Palmetto. Local treatment such as swabbing cervix with Tr. Iodine and Iodoform, as well as Stiptic, Astringent and Antiseptic injections have apparently proved benificial in a number of cases.

I believe that electricity will prove itself very useful

in these cases, especially when applied locally to the cervix, vagina or uterus as cases may require.

h. Endormetritis fills the uterine canal with a thick tenaceous mucous and often prevents the entrance of seminal fluid or destroys its vitality. We meet with quite a good many of these cases in the mare and they vary very materially in the consistency of the secretions. Endormetritis and resulting Leucorrhoea are the most unsatisfactory diseases we have to contend with in the treatment of barreness. In the first place it is far from being an agreeable task, and as the cases are generally of long standing when we get them they are not only the most difficult to cure, but the time and expense often exceeds the value of the animal.

The mare, as a rule, is emaciated, can not stand hard work, and though her apetite is often good, fails to put on flesh. The discharge is of a viscid, creamy character, often with a peculiar odor, that one requires to smell but once to remember, especially in any case you may get to attend at college and have to depend upon students to assist you with treatment, particularly the injection, as the smell stays by you often for a day or more, no matter how often you wash or disinfect. I am glad to say that the balance of my cases have been looked after by the owner or persons in charge, though it is often a great deal of trouble to get them to follow your instructions and get anything like favorable results. Mineral and vegitable tonics and mineral acids generally prove beneficial; Antiseptic injections, not too strong, as there is some danger of over doing; also Per Oxide of Hydrogen. Unless the Os is flaccid and well dilated, it is better to keep the parts open to allow drainage; as I have known of cases where fluid was retained from one day to the next, the horns of the uterus often being re-

laxed.

i. Polipi, Fibroids and Moles are not very common in my experience, having met with but three cases, all of them being outside of cervix and were very easily cured by excission, steptic and antiseptic dressings.

j. Flexion of Uterus and Cervix is not uncommon. In this the Os is turned to one side and during copulation it would be pressed against the wall of the vagina, entirely obstructing the passage to the uterus.

Huntress, 2:20¾ is said to be one of this kind, she being stinted for a number of years without any results and afterwards was examined by R. C. Mason, V. S., of Winona, Minn., who reported the case to me as such a decided flexion that he was compelled to turn his finger almost at a right angle to get it through the cervix.

k. Very small Os Internum.

It is a common thing to find barren mares who have been continually bred and repeatedly opened by breeders, stablemen and even veterinary surgeons, without the inner portion of the Os being dilated, and at other times a membrane across the Os Internum which is not ruptured. As a consequence they fail to conceive as effectually as if the membrane was over the vaginal surface of cervix.

l. A curtain of membrane, either or both, external or internal to cervix.

A very interesting case of this type came under my treatment during the month of July, 1891. The mare was sixteen years old and had failed to conceive, though stinted repeatedly at different seasons for the past ten years. I had known the mare some six years, she having been served by one of my own stallions during the year of 1886, but had given the case no special attention, and at that time knew

nothing more than that she was claimed to be very tight by the man who dilated her Os. She was given several leaps but did not conceive. She had been stinted about every season following to different stallions but to no purpose, and was sent to Dr. Curryer & Sons' stud at Crystal Lake, Minn., with instructions to use impregnator. The Doctor was unable to find the Os Uteri, it being concealed by folds of mucous membrane. I was called to examine the case and found a fold of mucous membrane reflected from upper vaginal surface of the Os. Having passed one finger underneath the folds of membrane, with a good deal of difficulty, I succeeded in dilating sufficiently to get one finger through the cervix ; I could then easily feel a second membrane at internal opening of cervix, but, my finger not being long enough, or the membrane was so strong, that I could not tear it. By taking impregnator and dilator No. 1 (small size) which is about one inch longer than my finger, and passing it through the cervix until the disk of impregnator came in contact with the vaginal surface of cervix ; I then made a thrust by pressure to handle of dilator, at the same time turning it laterally ; I then withdrew the dilator leaving the impregnator in position. The mare at once by straining, threw off at least three pints of a viscid, creamy fluid, which had no odor. I then had the uterus injected out, using hydropult which was continued daily until appearance of heat returned, some two weeks later, She was then served, using the small sized impregnator, and has since passed two or three periods, or about six weeks, having been tried twice a week without any signs of returning heat.

I simply wish to call your attention to the facts concerning this case. The mare had been repeatedly opened by parties who would generally be considered competent judges

and capable of opening mares to bred. This mare had been examined by a graduate veterinary surgeon, who also used the small sized impregnator, having succeeded in placing it *without the dilator.* The external fold of membrane was ruptured but the internal one was not noticed, and though the impregnator, to all practical purposes, was properly placed, the membrane, not being ruptured, there could be no chance of conception so long as it existed.

Equine Syphilis has proven a great hinderance to breeding by rendering pregnancy both uncertain and unsafe, and requires special consideration for which I would refer you to W. L. Williams articles on Equine Syphilis in American Veterinary Review.

Class No. 2. Causes preventing the production of a healthy ovum. I will consider but one—that of atrophy of the Ovaries, from old age and lack of use, as it will be seen by reference that none of these are curable diseases. I wish to note but one case, that of a black mare Blanche, 223½, belonging to me. I bought her in 1887 to experiment on. She had never had a foal though bred several seasons. After various trials, even by injecting semen through the cervix, she continued to remain in heat, so that, in December, I decided to kill her and hold an autopsy. The uterus, vagina and cervix were healthy and, in every way, normal, but on examination of ovaries they were found to be pale and atrophied, showing no signs whatever of Graafian Vesicles or any indication of having produced any ovules for months, possibly for years. Her teeth marks indicating over twenty-five years of age.

Class No. 3. Causes preventing passage of ovum into uterus, such as strictures or obliterations, absence, detachments and displacements, simply require mentioning to prove

how certainly these causes would prevent conception.

Class No. 4. Causes destroying vitality of semen, or preventing fixation of Impregnated ovum.

a. Endometritis, corporal or cervical, fills the uterine canal with mucus which either prevents the entrance of semen or destroys its vitality, has already been considered.

b. Membraneous Dysmenorrhoæ, c. Menorrhagia or Metrorrhagia, and e. Areolar Hyperplasia, are seldom if ever, recognized in mares, hence will be given no further consideration in this article.

d. Abnormal grows of any kinds, which fill the uterine cavity as for example Fibroid Polypi, &c., may prevent attachment of the ovum to the uterus, even if impregnated.

MALE STERILITY.

Lack of erectile power in the male is not uncommon and varies greatly with different stallions, as well as the same stallions at different seasons or portions of the same. At the beginning of the stud season many stallions fail to preform service with sufficient ardor, although they may have been good coverers seasons previous. This may be due to lack of tonacity, from continued non-use, though at other times such a state of things follows certain diseases, such as Catarrhal Fevers, Distemper and the like, as well as attacks of Spinal Meningitis; in other cases the blood supply may be interfered with from partial or complete obstruction to one or more of the arteries supplying the penis.

During the spring of 1886 a stallion was brought to my infirmary with apparent paralysis of the penis, the part hanging pendulous and protruding about six inches. The season previous he had covered sixty mares and had gone into winter quarters in good condition, but, during the win-

ter, suffered from an attack of Catarrhal Fever (Pinkeye) during which time the owner reported him as badly swollen about the penis and testes. The penis remaining swollen and pendulous for weeks. The stallion had already been blistered across the back several times. I applied electricity to the parts, which would for the time produce partial erection and so strenthen them as to enable him to withdraw it within the sheath, but he never regained power of erection, nor afterwards preformed stud service.

During the spring of 1889 I was consulted regarding a stallion who, the season before, covered forty mares and was sold with a warranty of a sure foal getter, but as he would not cover a mare at the beginning of the stud season, the purchaser naturally suspected that he had been cheated. I recommended treatment as follows :

Fl. Ext. Nux Vomica, Liq. Pot. Arsenalis, Fl. Ext. Ergot, Ferri Am. Citras, alternating with Phosphide of Zinc and Fl. Ext. Sanguinaria.

The treatment was continued for a short time when the animals vigor returned and there was no further trouble that season.

I also had a case of my own ; a four year old stallion who had been a good coverer until three years ago when I loaned him to serve some mares, at which time he was kicked on a front leg and nearly died as a consequence of erysipelas and distemper which followed. The following season he could scarcely be induced to serve a mare and then all to which he was stinted failed until using the preceeding prescription when he was successful in getting all five mares in foal, on which he had failed from February until July, though the mares were repeatedly served by him during that period.

b. Absence of spermatozoa is not uncommon, especially in colts less than two years old, and as a rule at any age should the testicles not appear in their natural locality, the scrotum. In Crypsorchids, as a rule, where neither of the testicles appear, no spermatozoa is to be found.

c. Old age is a common cause of impotency, but a great deal can be done to tone up the organs and revive the natural functions, by judicial use of some of the remedies that prove so beneficial in the lack of erective powers.

d. Excessive length of penis is far from being an advantage either to male or female. Such stallions are seldom sure foal getters, and often injure the mare during copulation. I have found it a great advantage in these cases to use a shoe boil boot as a washer, thus keeping six or eight inches of penis outside the vagina, and in many cases it has insured foals when the stallion was considered not only unsafe to the mare but uncertain as a foal getter. On the contrary, a stallion with a short penis will cover a greater number of mares and succeed in a larger percentage of foal getting.

During the summer of 1882 I stinted two mares to Seneca Star, he being a large horse with excessive length of penis and a very ardent coverer, though apparently not a sure foal getter, besides having injured several mares and killed one by lacerating the fundus of vagina. I decided to try him once by using a shoe boil pad as washer. The mare succeeded in getting in foal at the first service, and another mare was stinted without making use of the pad; though returned several times did not get in foal notwithstanding she had been a regular breeder before and had a colt by her side. The only mare getting in foal that season to Seneca Star, was my own on which the pad was used. The next season

the pad was used in serving mares to him and as a result he got some twenty mares in foal.

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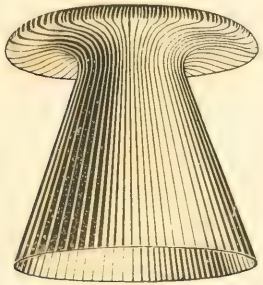
a. Weakness of Spermatozoa.

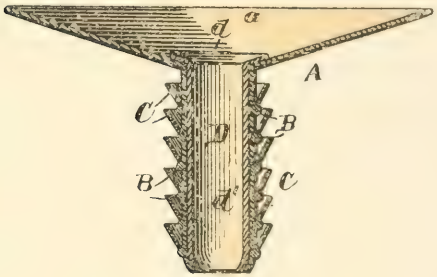
There is little doubt that the vitality of spermatozoa differs very materially in different stallions as well as different kinds of animals. I have at various times examined spermatozoa under the microscope, from different stallions after castration ; as a rule having a pail of warm water in which to place testicles after removing them. By so doing they are all kept in the same atmospheric conditions, the only difference being the length of time between the first and subsequent castrations. When ready to make microscopic examinations of semen, I would lay the different sets of testicles by themselves outside the water and put a specimen from each set on a glass slide, under a top cover, and examine them at different intervals of fifteen minutes to half an hour. During the summer of 1877 I made a number of these experiments and invariably found that spermatozoa from one set of testicles would outlive the others and as a rule the stallions whose testicles showed signs of injury or inflamatory process, the spermatozoa showed less vitality, whereas the size of the testicle seemed to make little or no difference with the vitality of the semen, both being healthy, small or medium sized testicles, as a rule, being less subject to injury, especially in stallions that were tracked or given hard, fast road work. In one case particularly, when specimens were examined, the animals having been castrated between 8 and 9 a. m. on a moist summer day, the specimens were prepared and examined between 9 and 9:30 a. m. I had occasion to show the specimens to parties as late as 5 p. m. of the same day, and to my surprise the specimen

FIGURE VI.

CUT 1.



CUT 2.



CUT 3.

from one set of testicles still showed vitality enough to move, while all the others showed no signs whatever of life.

I am of the belief that, under favorable circumstances, if properly prepared the semen of a stallion can be kept alive several days; and that at some future date we will be able to send specimens of semen to be injected instead of sending mares to be served. This would not only save the expense and time of shipping the mare, but a single service of a valuable stallion could be used to impregnate a number of mares by which means a stallion could as easily get two hundred colts in each season as fifty by ordinary methods.

All the different instruments and remedies now advertised for barrenness in mares I present for your consideration. These instruments and principles indicate ideas of greater or less value, but all point towards one great principal, the dilation of the cervix, and retaining it in position. To say that one or all of the instruments can prove successful in every case, is simply an impossibility; though I am sorry to admit that such advertisments as the following are to be found in our stock papers, regarding at least one of them. "Barren mares made to breed regularly. All mares made to conceive at first service."

This makes it practically non-professional, and is a poor recommendation for parties who authorize such statements. The Eureka may serve a special purpose in certain cases, but is so far from infallible that its claims are not only unjust and misleading to breeders, but unreliable and unreasonable.

The advantages in favor of this variety over the ordinary sponge tent, of equal size, are more imaginary than real; The essential parts of both being of the same material

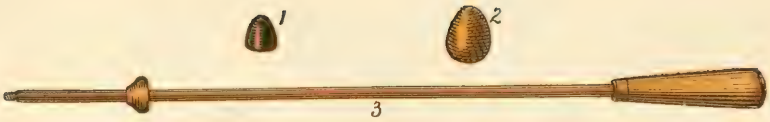
(sponge); each has a string attached to its large end, or base, to aid its withdrawal when parts are sufficiently dilated. The price is greatly in favor of the Tent being less than one-tenth as expensive.

Fig. VI, Cut 1, represents the Knight pattern, known as the "Eureka Pregnator." The Eureka requires from six to ten hours for expansion, hence the mare must either wait or return for service the next day. It is the most expensive one of the kind in the market, as each service requires a new instrument.

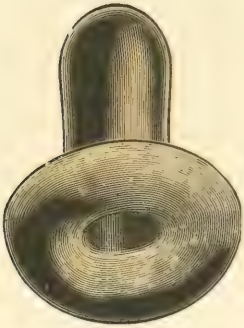
Fig. VI, Cut 2.—The funnel shaped instrument is practically out of use on account of the great difficulty attached to placing it. The exceedingly wide spreading end, that is intended to pass through the cervix, has to be folded or rolled very tightly in order to get it into even a fairly loose Os, and in cases that are constricted less than to admit two fingers it serves little or no purpose; even should it be crowded into the cervix, it can not expand and is either thrown out by the mare or works out during the act of copulation.

Fig. VI, Cut 3.—The Meddick pattern consists of a flat disk, (a.) and a soft rubber tube, the latter surrounded by convolutions of flanges of rubber, represented like saw teeth (C B C B) to retain it in position, and is held in shape by a hard rubber tube, (d.) small enough to pass through the others. This is too complicated to be practical even if the convolutions were not a source of annoyance in removing it from the cervix, besides retaining filth, unless every precaution in cleaning and disinfecting is followed after each service. Besides this a hard rubber tube when the least projecting (as represented by flange d.) would subject the glans penis to more or less pain, if not injury, in proportion

FIGURE VII.



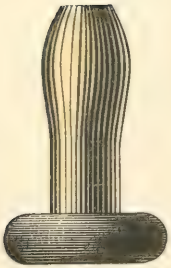
CUT 1.



CUT 2.

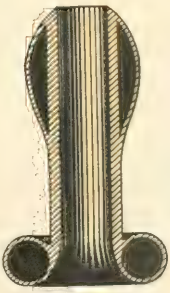
CUT 3.

CUT 4.



CUT 5.

CUT 6.



CUT 7.

CUT 8.

to the closeness of the cover and ardor of the stallion.

As to my own patterns of Dilators and Impregnators, cuts 1, 2, 3, Fig. VII, represent those which have been in use for several years. The Impregnator (cuts 2, 3.) consist of hollow tubes or cones, represented at one-third their real size. They are composed of soft rubber of sufficient thickness and firmness to retain its shape and resist the pressure of the cervix. The Impregnator, represented by Cut 3, is constricted at the disk portion, that it may be self retaining. The disk on its posterior surface is made convex, so as to correspond to the urethral sinus of the glans penis, while the opening through the disk is sufficiently large to admit the projecting end of urethral tube. The greatest difficulty is to make the two sizes meet all the requirements and variations of the cervix, as well as the peculiarities of the stallion, and the idiosyncrasies of the owner or attendant. In certain cases Cut 2, small size Impregnator, proves difficult to insert on account of the close, tense Os, but with dilator this is quite easily obviated. In other cases Cut 3, large size Impregnator, may be too small to be retained and may require a larger size.

Some stallions are especially sensative while covering a mare ; generally those stallions whose parts are larger than ordinary or those having a big season and are not very anxious when they find the least interference. To obviate these difficulties, I have to present you the new model Impregnators and Dilator, represented by cuts 4, 5, 6, 7, 8, fig. vii, one-third their real size. They consist of one size tube internally, so that one dilator fits the entire set, while the external dimentions correspond to the size of the cervix, anywhere from one inch to two and one-fourth inches in diameter, and from three and one-half to four and one-half

inches in length, By reference to cut 7, it being a longitudinal section, it will be seen that the disk consists of a hollow air space, as well as the bulb. The disk so closely corresponds to the Os in pliability that the most irritable stallion should fail to perceive the difference, and as a consequence makes as close a cover as when no instrument is used. The advantages in favor of the tubular variety of impregnators, are the close approximation to the normal condition of cervix during heat, rendering complete—as it does—the communication between the vagina and uterus, thus assuring easy access for the seminal fluid, besides being easily inserted and ready for immediate use. Upon withdrawal of the impregnator the cervix contracts immediately closing the Os so completely that there is little chance for the escape of semen, even if mare should strain. They are *cheap* as one *will last for years*, and can be used on any number of cases.

The sizes correspond to the different conditions of cervix, and are easily placed in position by means of dilator and are entirely safe.